Procedure for **P**eriodic **M**anufacturer's **S**ervice

Evita 4 and Evita 2 dura
with software version 3.n or 4.n
in the USA and Canada

A PMS Checklist form P/N 41 15 068, available from the Dräger Medical, Inc. Technical Service Department, shall be completed by the Technical Service Representative each time a PMS is performed.

Electrical safety test: If required by Customer record measured values additional to the PMS Checklist in the following form "Electrical Safety Test Form Evita 4 / 2 dura".

Caution: Service, Inspection and Calibration are to be performed by Dräger trained and authorized Service Personnel only!

Note: Test Equipment for this procedure is listed in the document "Test equipment for CCS devices". DO NOT USE any test equipment having an expired calibration date.

Warning: During Service and Inspection some systems may be disconnected. Ensure these systems are reconnected, test equipment is removed and all covers are replaced after testing!

Note: If only expiratory valves are to be tested perform test item 2.4, 3.1.1, 4.1, 4.2.2, and 10.2.

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1 Device configuration and options

Document operating data, hardware configuration and installed options.

1.1 Documentation of operating data and standard configuration

- Software version:
- Hours of operation:
- Evita 4 Control panel, Serial number (read out under 2.5):
- Type of display (read out under test item 4.7):
- ID number:

1.2 Documentation of hardware options

- Capno Plus (socket for CO2 sensor provided on lower PCB):
- Serial number of CO2 sensor:
- Sat (socket for SpO2 sensor provided on lower PCB):
- DC (DC connection for external battery provided next to mains input):
- Link (Communication PCB with 2x RS 232, 2x CAN, 2x analog output):
- NeoFlow (PCB with connection for NeoFlow sensor):
- Multi Function PCB (PCB with Nurse Call and connection Remote Pad), as of SW 4.n
- 2nd ambient pressure sensor for Multi Function PCB, as of SW 4.n:
- Remote Pad with 3 m cable, as of SW 4.n:

1.3 Documentation of software options

- Breathing Support Package (Canada only):
- ATC:
- SW 4 Plus, as of SW 4.n:
- Monitoring Plus (Evita 2 dura only):
- Ventilation Plus (Evita 2 dura only):
- Service Plus (Evita 2 dura only):

2 General condition of Evita 4 / 2 dura

2.1 Labeling

2.1.1 Operating Instructions

Check and indicate if the Operating Instructions are present in line with installed software or hardware options.

2.1.2 Labels on the Evita 4 / 2 dura

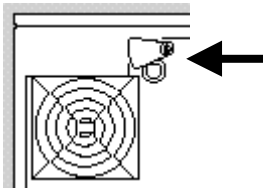
Check if the labels are present. For more information refer to the Operating Instructions Evita 4 or Evita 2 dura:

- Label P/N 83 06 124 on the left side of the ventilator (Danger!…, Warning!…, Caution!…)
- Label P/N 83 06 123 on the blue cover on right side of inspiratory unit (Caution! Do Not Block Air Intake)

2.2 Check physical condition of electronic system

At the back side:

- All PCB's are secured with 2 screws.
- Not used slots on the back are covered and should secured with two screws.
- All Sockets on the back, no visual signs of damage to connectors for sensors and communication interfaces
- Blue filter P/N 84 12 384 on the back for cooling air must not be compressed, replace yearly, see section 3.2.1
- Mains switch with protective cover (picture shows off position), parts not damaged



- Power cord with attachment of power cord with strain relief, parts are present and not damaged
- Fan cover, is present and not damaged, clean if necessary
- Cooling-air fan, Briefly switch on unit for testing fan, fan is running with no discernible defects.
- DC connection for external battery (option), parts not damaged
- Side covers with plastic screws, parts are present and not damaged

On the top:

- Cover of basic unit / housing
  If there is no tray or Dräger monitor on the Evita, the 4 holes in the cover must be sealed with plugs (front 2 x P/N 84 12 857, rear 2 x P/N 84 12 858).

2.3 Check physical condition of pneumatic system of basic unit

At the back side:

- O2 /Air inlet block with DISS connectors, parts are not damaged
- Blue back plate with heat sink, all screws are present

At the front side:

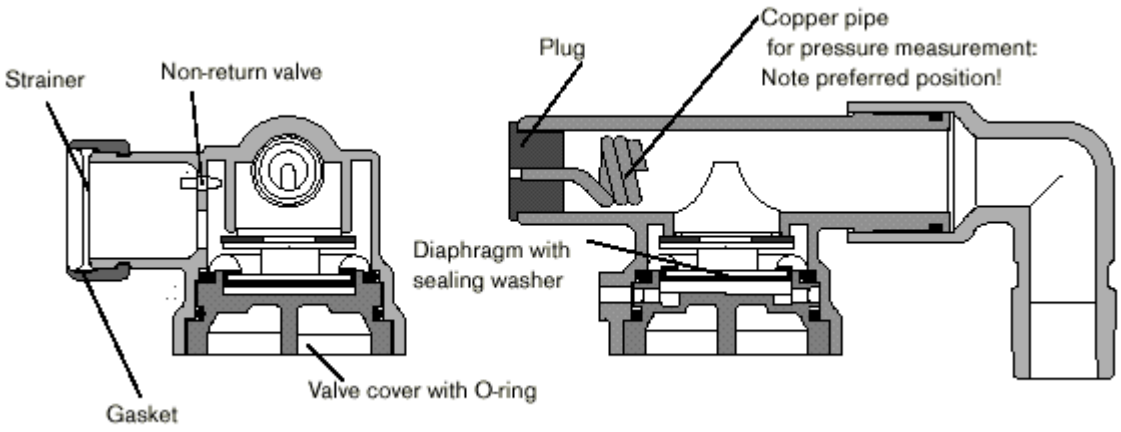
- Unscrew blue cover on the right side next to inspiratory block and check for:
  - Plastic screw of cover not damaged
  - Ambient filter (F3.1) P/N 84 12 384, filter is present and not compressed, replace filter yearly, see section 3.1.2.
  - Cooling-air fan, Briefly switch on unit for testing fan, fan is running with no discernible defects, clean if necessary.

  Do not assemble cover.
- O_2 amplifier and O_2 sensor
  Unscrew the two screws of the O_2 amplifier and pull the O_2 amplifier off. Pull out O_2 sensor and check for:
  - Non-return valve (D3.1) in O_2 amplifier, part is present and not damaged.
  - Contact pins of the O_2 amplifier to the O_2 sensor and to the inspiratory block, parts are present and not damaged
  - The lip seal P/N 84 12 938 for the O_2 sensor mount is present and not damaged
  - The O_2 sensor P/N 68 50 645 is present
  - Seal P/N 84 13 031 between inspiratory block and O_2 amplifier, part is present and not damaged.

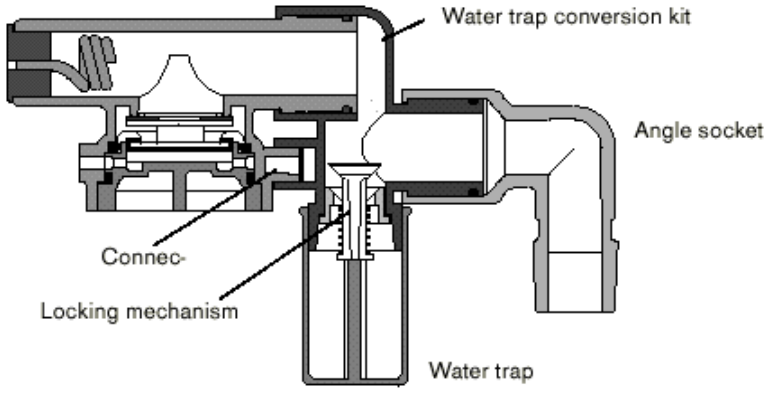
  Re-assemble parts of O_2 measurement and the blue cover.
- Inspiratory nozzle, check for damage, labeling (arrow pointing down), and rotation function.
- Medicament nebulizer output, check for damage and labeling
- Expiratory valve mount, check for:
  - 2 Lip seals, parts are available and not damaged.
    Please note: Do not seal lip seals when Evita is switched on.
  - Engagement function of expiration valve
  - Fan cover of fan of expiration valve heating (see test item 4.19), part is clean and not damaged
  - Flow sensor mount, part is available and not damaged
  - Flow sensor P/N 84 03 735, part is available and not damaged
- Check diaphragm system Y3.1 in the inspiratory block if the top cover of the block is not labeled with a red dot:
  - Open the pneumatics.
  - Remove top cover (2 screws) on top of inspiratory block and pull out diaphragm system.
  - Check if the nut of the diaphragm system is firmly fitted.
  - Secure nut with screw locking compound (P/N 11 84 687).
  - Assemble diaphragm system and cover. Make sure that the O-ring P/N E 20 567 between cover and inspiratory block does not get lost.
  - Label tested inspiratory block with a red dot on the top cover with screw locking compound (P/N 11 84 687)
  - Close pneumatic section.

2.4 Check physical condition of expiratory valve(s)

The Evita 4 / 2 dura may have several expiratory valves.
Check all available expiratory valves and enter serial numbers into the PMS Checklist form.
Visual check of individual components of all Expiratory Valves:



- Gasket (lip seal) with strainer (screen), parts are available and not damaged
- Non-return valve (D5.1), part is available and not damaged
- Plug with copper pipe, note preferred position, parts are available and not damaged
- Valve cover with O-ring, parts are available and not damaged
- Crater, not damaged
- Plate for expiratory diaphragm and sealing washer, part is available and not damaged
- Replace expiratory diaphragm P/N 84 10 181 and sealing washer P/N 84 07 979 yearly, see section 3.1.1
- Nozzle, check for damage, labeling (arrow pointing up), and rotation function
- Check water trap option with container (if available), parts are not damaged.



Please note: The option water trap is required for the NeoFlow option.

Reassemble expiratory valves ready for operation.

2.5 Check physical condition of control unit Evita 4

Please note: The S/N of the control unit is located next to the connection for the cable.
Check for:

- Housing, parts are not damaged
- Frame, securely fitted
- Swivel function and engagement
- Detachment function
- Rail mount with mechanical lock, parts are available and not damaged
- Cable reels, parts are not damaged
- Connecting cable, connector attached to control panel and to front panel of basic housing by 2 screws each.
- Keyboard with labeling and rotary knob, parts are not damaged
- Touch screen with frame, part not damaged

2.6 Check physical condition of front panel Evita 2 dura

Check for:

- Housing, parts not damaged
- Frame, securely fitted
- Keyboard with labeling and rotary knob, parts not damaged
- Display, part not damaged

2.7 Check physical condition of CO_2 measurement (option)
Check for:

- Sensor housing with anti-kink feature for cable, parts not damaged
  Important for electrical safety: housing must be tightly sealed, damage not permissible.
- Cable with connector, parts not damaged
- Span check filter with labeling of CO_2 concentration attached to connecting cable, parts are available and damaged
- Sensor windows, clean and in perfect condition
- CO2 Cuvette, adult size, P/N 68 70 279: Windows bonded flat in cuvette, clean and in perfect condition
- CO2 cuvette, pediatric size, P/N 68 70 280: Windows bonded flat in cuvette, clean and in perfect condition
- Parking holder P/N 84 12 840 for sensor, Windows in parking holder are clean, parking holder securely fitted

2.8 Check physical condition of SpO_2 measurement (option)

Check for:

- Dura SpO_2 sensor DS-100 A, P/N 82 01 001, not damaged
- Sensor extension cable P/N 82 01 015, not damaged

2.9 Check physical condition of Remote Pad (option, as of SW 4.n)

Check for:

- Housing, parts are not damaged
- Keyboard with labeling, parts are not damaged
- Cable with connector, parts are not damaged

2.10 Check physical condition of trolleys for Evita 4 / 2 dura

2.10.1 Two-column trolley P/N 84 11 680, produced up to 1997 (if available)

- Check for damage and locking mechanism:
  - 4 feet and a coding pin are available on the bottom side of the Evita. Evita is secured by locking mechanism on the stand.
  - Check screws for the 4 yellow caps, verify the hardware is secure.
- Connection of the mount to the two columns, check tightness of screws (hexagon socket 6mm)
- Check casters: 2 castors are lockable, casters not damaged and dirty, check tightness of screw connections with 35 Nm (25.9 lb-ft)
- Yellow caps, check tightness of yellow cap screws
- Humidifier holder, part not damaged
- Cabinet (option, if available), parts not damaged

2.10.2 New single-column trolley Evita Mobil as of 1997 (if available)

- Check for damage and locking mechanism. 4 feet and a coding pin are available on the bottom side of the Evita 4/2 dura. Evita 4/2 dura is secured by locking mechanism on the stand.
- Check the 4 black casters: 2 castors are lockable, casters not damaged and dirty, check tightness of screw connections with 25 Nm (18.4 lb-ft)
- Check accessories for damage:
  - Humidifier holder P/N 84 11 956 (option)
  - Cylinder holder P/N 84 11 970 (option),
  - Evita Mobil height extension P/N 84 13 962 (required for cylinder holder)
  - Battery Back up kit (option, in bottom of trolley) with connecting cable for DC module, replace batteries every 2 years, see section 3.3.2.

2.11 Check physical condition of accessories for Evita 4 / 2 dura (if available)

Check the following parts for damage:

- Hinged arm
- Evita 4 / 2 dura temperature sensor P/N 84 05 371
- Tubing systems as per Operating Instructions
- Dräger Adult test lung 84 03 201, comprising:

Mask elbow	P/N M 25 649
Catheter connector ISO no. 7	P/N M 25 591
Breathing Bag 2 Liter	P/N 21 65 694

  Important: Make sure breathing bag is not over inflated
- Neonatal test lung (bellows K) P/N 84 09 742

- Accessories for Neoflow option (if option is installed)
  - Flow sensor cable P/N 84 09 626, not damaged, cable socket must reliably engage in flow sensor insert
  - Flow sensor (ISO 15, small dead space) P/N 84 11 130 with flow sensor insert P/N 84 10 179
- Central supply hoses for O2 and Air comply with regional regulations. Check for damage and leakage.
- Option High Pressure Line Filters for Air (Kit with hoses P/N 45 10 808) and O_2 (Kit with hoses P/N 45 10 807). Drain filters if necessary. Check for damage and leakage. Replace filter Air P/N D700133 or filter O_2 P/N D700131 every year, see section 3.4.

3 Replacement of routine maintenance parts

Ordering frequency for one device Evita 4 / 2 dura with 2 Exp.-Valves:

When	What
1 year	A
2 years	B
3 years	A
4 years	B
5 years	A
6 years	C
7 years	A
8 years	B
9 years	A
10 years	B
11 years	A
12 years	C

A Parts needed every 12 months:

- Kit PMS 12 months - Evita 4 / 2dura with 2 Expiration Valves P/N 41 14 761

B Parts needed every 24 months:

- Kit PMS 24 months - Evita 4 / 2dura with 2 Expiration Valves P/N 41 14 762
- Additional parts for units with DC module option, see section 3.3

C Parts needed every 72 months (6 years):

- Kit PMS 24 months - Evita 4 / 2dura with 2 Expiration Valves P/N 41 14 762
- 1 x Real-time clock P/N 18 37 087
- Pressure regulators, see section 3.1.4
- Additional parts for units with DC module option, see section 3.3

Information on available PMS kits:

- Kit PMS 12 months - Evita 4 / 2dura with 2 Expiration Valves, P/N 41 14 761:
  2 x Filter 84 12 384
  2 x Diaphragm 84 10 181
  2 x Sealing washer 84 07 979

- Kit PMS 24 months - Evita 4 / 2dura with 2 Expiration Valves, P/N 41 14 762:

1 x Kit PMS 12 month	41 14 761	
2 x Filter	84 08 208	
1 x Flat packing gasket	84 08 204	(for Dräger gas connection block)
2 x O-Ring	84 11 516	(for FAS gas connection block)
1 x Lithium Battery	18 35 343	

3.1 Replacement of parts in the pneumatics

3.1.1 Replacement of expiratory diaphragm system

Replace expiratory diaphragm P/N 84 10 181 and sealing washer P/N 84 07 979 in the expiratory valve diaphragm system every year.

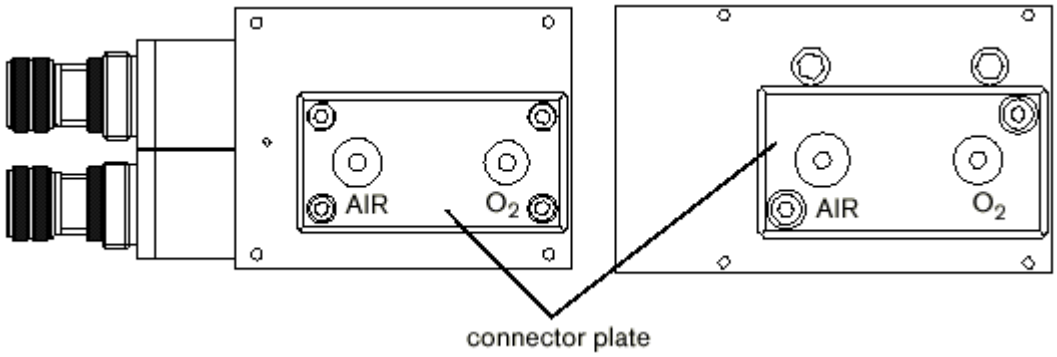
3.1.2 Replacement of cooling air filter in the pneumatics

Replace cooling air filter P/N 84 12 384 on the right side next to inspiratory block every year.

3.1.3 Replacement of filters in gas supply block

There are two different versions with external distinguishing features:

Dräger gas connection block: FAS gas connection block:



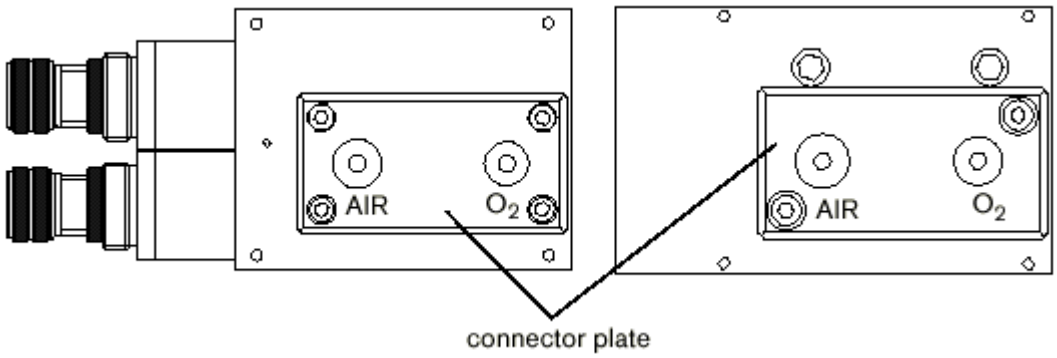
Dräger gas connection block:
Replace filter P/N 84 08 208 (2x) and flat packing gasket P/N 84 08 204 in the inlet unit of the gas connection block every 2 years.
Note: Coarse structed (screen) side of the filter shows into the gas connection block.

FAS gas connection block:
Replace filter P/N 84 08 208 (2x) and O-rings P/N 84 11 516 (2x) in the inlet unit of the gas supply connection every 2 years.
Note: Coarse structed (screen) side of the filter shows into the gas connection block.

3.1.4 Replacement of O_2 and Air pressure regulators in the gas connection block

There are two different versions with external distinguishing features:

Dräger gas connection block: FAS gas connection block:



Dräger gas connection block:
Replace pressure regulator P/N 84 08 205 (2x) with supplied O-rings every 6 years.

FAS gas connection block:
Replace diaphragm P/N 84 11 513 (2x) and valve tappet P/N 84 11 514 (2x) every 6 years.

3.2 Replacement of parts in the electronics

3.2.1 Replacement of cooling air filter electronics

Replace cooling air filter P/N 84 12 384 on the backside of electronics every year.

3.2.2 Replacement of battery on CPU 68332 PCB

Replace battery P/N 18 35 343 on the CPU 68332 PCB every 2 years.
Important: Prior to replacement switch on device for 2 minutes to charge capacitor for RAM power supply.

3.2.3 Replacement of real-time clock on CPU 68332 PCB

Replace real-time clock P/N 18 37 087 on the CPU 68332 PCB every 6 years.
Important: Re-enter date and time afterwards.

3.3 Replacement of batteries of DC module (option)

3.3.1 Replacement of internal batteries in DC module

Replace batteries P/N 18 45 284 (2x) in DC module every 2 years.
Important: Label new batteries with date of installation.

3.3.2 Replacement of external batteries in Evita single column trolley (if available)

Replace batteries P/N 18 43 303 (2x) in the trolley base every 2 years.
Important: Label new batteries with date of installation.

3.4 Option high pressure line filters for O2 and Air

If options High Pressure Line Filters for Air (Kit with hoses P/N 45 10 808) and O_2 (Kit with hoses P/N 45 10 807) are installed replace filter Air P/N D700133 and filter O_2 P/N D700131 every year. Afterwards check for leakage.

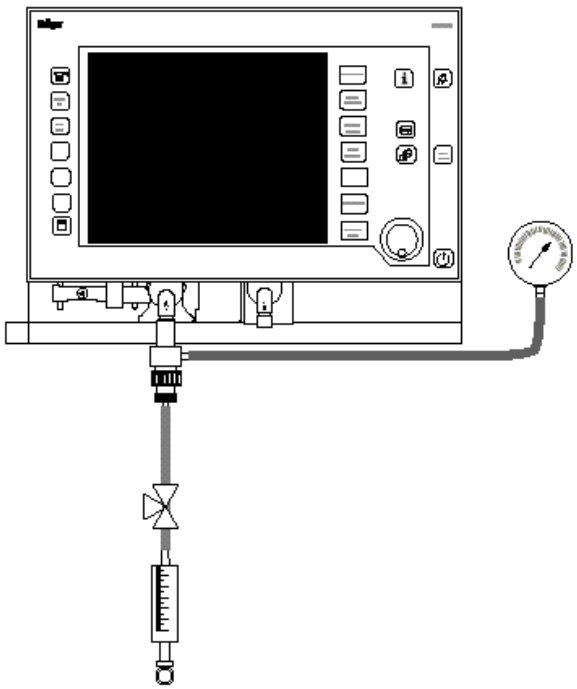
4 Functional Test

4.1 Expiration valve, testing of pneumatic non-return valve D5.1

Note: Leakage test of the non-return valve D5.1 of the expiration valve at a negative pressure of -4 cmH_2O. The valve has to maintain the negative pressure.

Test set-up:

Connect test set-up to expiration socket. (Fig. Shows Evita 4; Evita 2 dura identical)



Test equipment for test set-up:

- Pressure measurement device
- Silicon hoses to connect pressure measurement device and syringe, max. length 300 mm (12 inch)
- Syringe 60 ml P/N 79 01 541
- T-Piece (conical sleeve) P/N 84 00 904
- Catheter connector set P/N 84 03 684 (some of the connectors are included in tubing system Evita P/N 84 12 092)

Evita 4 / 2 dura is switched off.

Use syringe to generate a vacuum of -7 cmH_2O (mbar) and then reduce vacuum level to -4 cmH_2O (mbar).

Test value:
After 5 seconds, vacuum must still be at least -1 cmH_2O (mbar).

Check all available expiration valves in this test set-up.

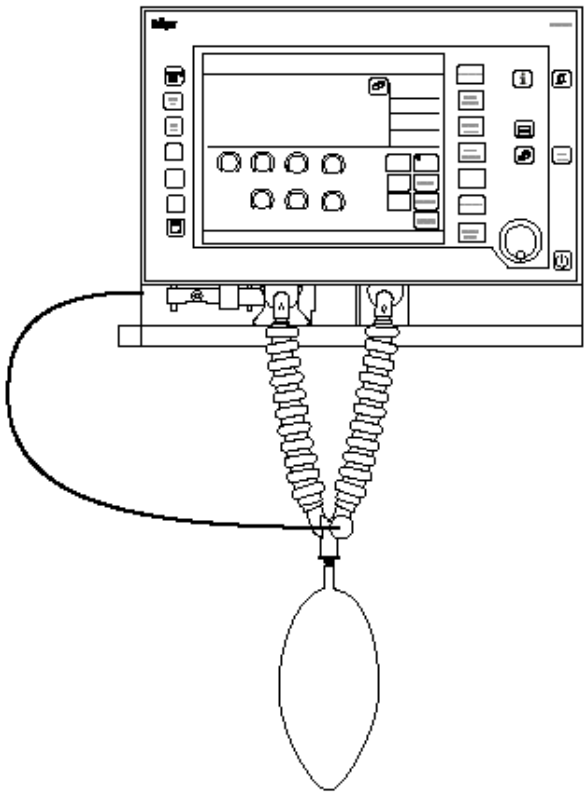
If test value does not pass check and or replace the non-return valve D5.1 in the expiration valve. Repeat test.

4.2 Self test and device check in standby

Note: Testing of the function of the safety valve Y1.3, the switch-over valve Y1.1, calibration of O_2 and flow measurement, and saving the values of the supply pressure sensors PAir and PO2 at ambient pressure to be used in test item 4.4.1.

Test set-up:

Assemble Evita 4 / 2 dura ready for operation (Fig. shows Evita 4; Evita 2 dura identical).



Test equipment for test set-up:

- Tubing system Evita adult, e. g. Hose Set E Blue P/N 84 12 092
- Y piece P/N M 25 650 if no temperature sensor is available
- Adult test lung, P/N 84 03 201 (with catheter connector ISO no. 7)

- Connect compressed O2 and Air supply (40 to 87 psi / 2.7 to 6 bar).
- Connect up adult tubing system with test lung **without** humidifier.
- Connect sensors:
  - CO2 Sensor (option) and park sensor on its park bracket
  - NeoFlow Sensor (option)
  - Temperature sensor (option)

4.2.1 Self test after power on (switch-on test)

Test set-up: See section 4.2.

Switch on unit.

Test value:
Self-test OK (no alarms and device error codes). There must not be any pixel errors in information displayed on screen.
Note: Ultimate screen brightness is only achieved after several minutes.

4.2.2 Device check in standby

Test set-up: See section 4.2.

Switch unit to standby after finishing self test and confirm with "Alarm/Reset".

For units with installed CO_2 measurement only: Wait 3 minutes to warm up CO_2 sensor.

Evita 4:
Call up and carry out device check including leak check of tubing system.

Evita 2 dura
Call up and carry out device and tightness check of tubing system.

Test value:
- All tests OK.
- The maximum permissible leakage flow is 100 mL/min, as testing is being performed with a tubing system with no humidifier.

Perform leak/tightness check with all expiration valves to establish any leakage in crater area of expiration valves.

Switch Evita 4 / 2 dura off.

Continue with next test item 4.3 if OK.

If max flow rate in the leak/tightness check is exceeded, perform following tests to eliminate leak(s):

- Check tubing system

- Check expiration valve for leaks; pay particular attention to tightness of cover. Use a different expiration valve for trouble-shooting.

- If leak is not in tubing system:
  Unscrew O_2 amplifier, remove O_2 sensor and seal off opening for O_2 sensor with rubber plug (P/N 79 01 298). Repeat leak test.
  If measured value is then OK; leak is to be found in O_2 amplifier area.

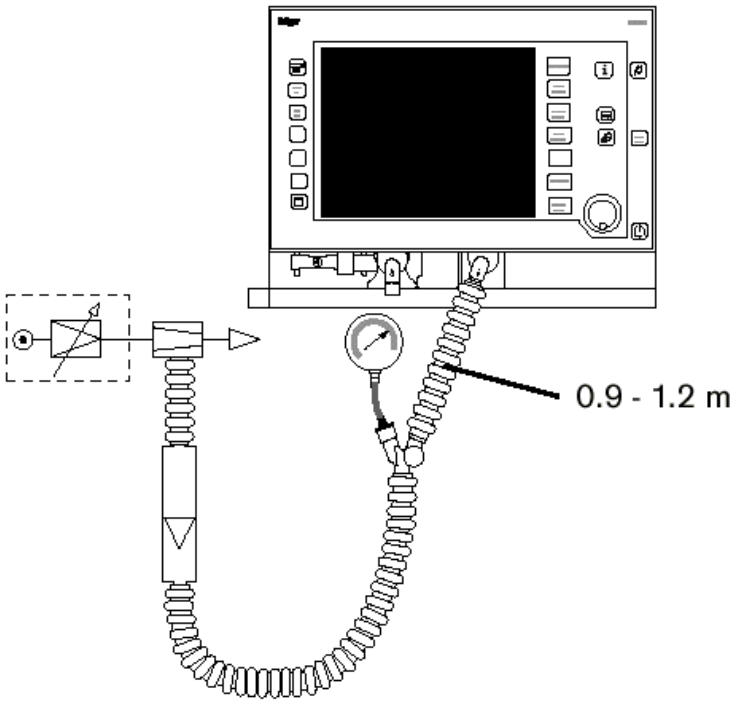
- If this does not improve measured value, the reason may be a leak in the 100-mbar valve D3.3, in the pneumatic valve Y3.1 or in the valves Y6.1 / Y6.2. The test set-up described in test item 4.4.4 (Test 1) is recommended for further trouble-shooting.

4.3 Testing of pneumatic safety valves

4.3.1 Testing of pneumatic valve D3.1 (emergency breathing valve)

Note: Testing the opening pressure of emergency breathing valve D3.1 in the O_2 amplifier at a negative flow of 60 L/min.

Test set-up:
(See. Fig Evita 4; Evita 2 dura identical)



Test equipment for test set-up:

- Tubing system Evita adult, e. g. Hose Set E Blue
  P/N 84 12 092
- Y piece P/N M 25 650 if no temperature sensor is available
- Pressure measurement device
- Silicon hoses to connect pressure measurement device and injector
- Test pressure regulator
  P/N 79 10 342
- Injector for test pressure reducer P/N 79 00 930
- Flow meter P/N 79 00 718
- 2 x Port ISO connector
  P/N M 25 647
- 2 x Coupling sleeve
  P/N M 13 506

Evita 4 / 2 dura is switched off.

Important: Use an adult circuit 3 - 4 feet (0.9 m - 1.2 m) between Y-piece and inspiratory nozzle.

Connect reference pressure gauge (expected max. pressure -15 mbar/cmH_2O) to the Y-piece.

Set flow rate of 55 - 60 L/min by way of test pressure regulator with injector.

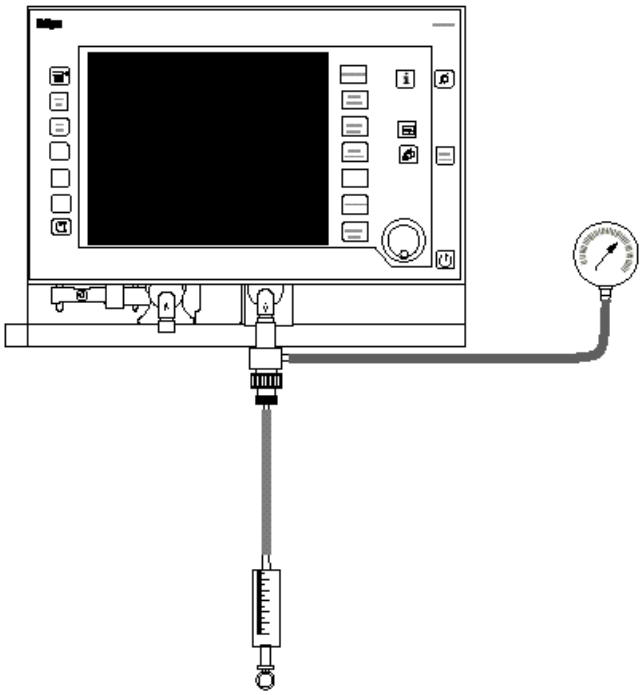
Test value:
Measured value should be between 0 to -6 cmH_2 (mbar)

If test value does not pass check and or replace the one way valve D3.1 in the O_2 amplifier. Repeat test.

4.3.2 Testing of pneumatic valve D3.2 (10 mbar), leakage of emergency breathing valve D3.1

Note: Testing the opening pressure of valve D3.2 in the inspiration block at a flow of 1 L/min and the leakage of emergency valve D3.1 in the O_2 amplifier.

Test set-up:
(See Fig. Evita 4; Evita 2 dura identical)



Test equipment for test set-up:

- Pressure measurement device
- Silicon hoses to connect pressure measurement device and syringe, max. length 500 mm (20 inch)
- Syringe 60 ml P/N 79 01 541
- T-Piece (conical sleeve) P/N 84 00 904
- Catheter connector set P/N 84 03 684 (some of the connectors are included in tubing system Evita P/N 84 12 092)

Expected max. pressure for the pressure gauge 20 cmH_2O (mbar).

Evita 4 / 2 dura is switched off.

Connect compressed O_2 and Air supply (40 to 87 psi / 2.7 to 6 bar).

Using a syringe inject a volume of 50 ml into the inspiration nozzle in 3 +/- 1 seconds.

Test value:
Measured value should be between 5 - 10 cmH_2O (mbar).

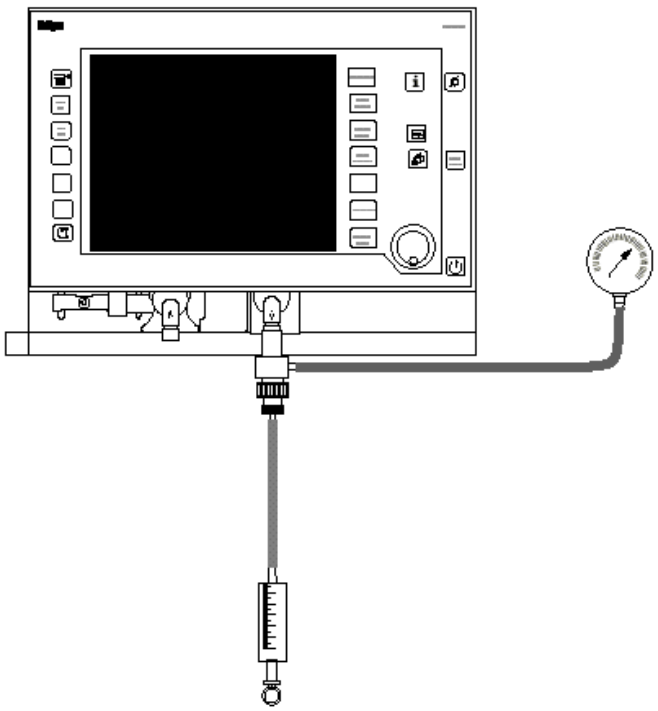
Pull syringe out again for next test.

If test value does not pass check and or replace valves D3.2 in the inspiratory block and D3.1 in the O_2 amplifier. If the reason is D3.1 in the O_2 amplifier repeat also test item 4.3.1.

4.3.3 Testing of pneumatic valve D3.3 (100 mbar)

Note: Testing the opening pressure of valve D3.3 in the inspiration block at a flow of 1 L/min.

Test set-up:
(See Fig. Evita 4; Evita 2 dura identical)



Test equipment for test set-up:

- Pressure measurement device
- Silicon hoses to connect pressure measurement device and syringe, max. length 500 mm (20 inch)
- Syringe 60 ml P/N 79 01 541
- T-Piece (conical sleeve) P/N 84 00 904
- Catheter connector set P/N 84 03 684 (some of the connectors are included in tubing system Evita P/N 84 12 092)

Expected max. pressure for the pressure gauge 130 cmH_2O (mbar).

Connect compressed O2 and Air supply (40 to 87 psi / 2.7 to 6 bar).

Switch on unit:

Switch unit to standby after finishing self test and confirm with "Alarm/Reset".

Note for SW 4.n: Perform this test within 3 minutes after switching to standby! After this time the safety valve Y1.3 will be deactivated in standby and no pressure build up is possible. For activating the safety valve Y1.3 after this time again leave and enter standby.

Important:
- The message "Execute device check " should not then be displayed. If this is the case, refer to test 4.4.1 to find the cause. The test can however still be performed.
- The alarm "Pressure meas. inop." may be given in this test. It can be ignored. The alarm must be reset after completing the test.
- The pressure in the test set-up may also increase. This results from a leakage in the mixer, which is not zeroed directly after switch-on. Zeroing only takes place during ventilation or after 3 minutes on standby. The test can however be performed

Using a syringe inject a volume of 50 mL into the inspiration nozzle in 3 +/- 1 seconds.

Test value:
Measured value on reference pressure gauge should be between 103 - 112 cmH_2O (101 - 110 mbar).

If test value does not pass adjust and or replace the one way check valve D3.3 and Y3.1 in the inspiratory block. Repeat test.

4.4 Testing of pressure sensors

Device is switched to standby.

Use the following keys to call up service mode:
Evita 4: "Configuration" ⇒ "System Defaults" ⇒ "Service diagnosis" ⇒ "4 6 5 5"
Evita 2 dura: "Calib./Config." ⇒ "Ventilation" ⇒ "4 6 5 5"

Note: Evita 2 dura requires the option "ServicePlus" or connect RS232 cable P/N 79 01 808 or P/N 79 01 888 to COM1. Otherwise, no data will be displayed in service mode.

4.4.1 Testing of supply pressure sensors and ambient pressure sensor at ambient pressure

Note: Plausibility check between the supply pressure sensors PAir and PO2 (values stored during last device check) and the ambient pressure sensor on the CO2 Carrier PCB at ambient pressure. Both supply pressure sensor are absolute pressure sensors (displayed value = ambient pressure + supply pressure).

Test set-up: See section 4.4.

Call up diagnosis pages "Electronic" ⇒ "Sensors" in service mode

Read out values for ambient pressure measurement **Raw, Pambient, Pair** and **PO2** in mbar.

Test value:
The **Pair** and **PO2** values are ascertained in the device check and must be within the following limits:
Lower limit = 0.94 x **Raw**
Upper limit = 1.06 x **Raw**

Important:
For subsequent testing, make a note of **Pambient** (= current ambient pressure).

If the limits are not satisfied then one or two of the pressure sensor is/are out of tolerance. As a general rule, the values must be at ambient pressure level. If deviation exceeds 8% "Execute device check" appears whenever the Evita is switched on.

The ambient pressure is a function of height above sea level and weather conditions. The following table provides information:

Altitude above sea level in		**Ambient pressure** approximately in
meter	feet	mbar
0	0	1013
100	328	1001
200	656	990
300	984	978
400	1312	966
500	1640	954
600	1969	943
800	2625	921
1000	3281	899
1200	3937	877
1400	4593	856
1600	5249	835
1800	5906	815
2000	6562	795

4.4.2 Testing of supply pressure sensors PAIR and PO2

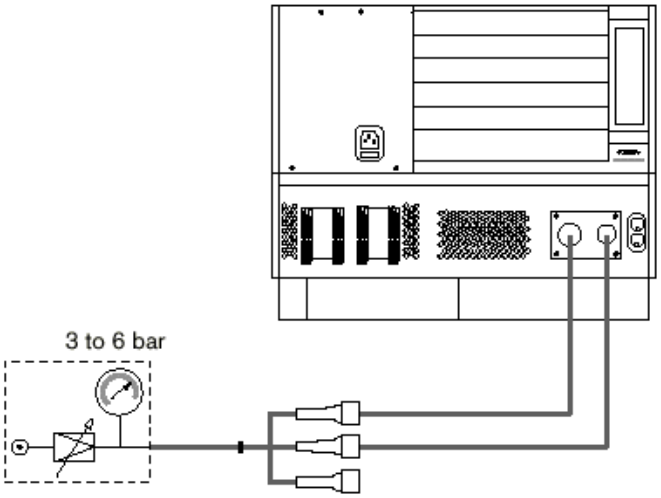
Note: Displayed values of the supply pressure sensors PAIR and PO2 are compared with a reference pressure gauge at 43 to 87 psi relative supply pressure. Both supply pressure sensor are absolute pressure sensors (displayed value = ambient pressure + supply pressure).

Test set-up:

- Apply a known pressure between 43 and 87 psi (3.0 and 6.0 bar) by way of central supply of O2 and AIR

  or, if the pressure in not known:

- make use of the following test set-up:



- Call up diagnosis page "Pneumatic" ⇒ "Valves" in service mode.
- Read out pressure Air and O2 under "HPSV"

Please note: 1 bar = 14.505 psi / 0.2 bar = 2.9 psi

Test value:

O2 = ambient pressure + O2 supply pressure fed in ± 0.2 bar
Air = ambient pressure + Air supply pressure fed in ± 0.2 bar

If test values do not pass check and/or replace supply pressure sensors.

4.4.3 Testing of airway pressure sensors at ambient pressure

Test set-up: See section 4.4.

Inspiration and expiration nozzles are open.

Call up diagnosis page "Pneumatic" ⇒ "Sensors" in service mode.

The values of the airway pressure sensors are read out in the service mode.

Test values:

- Display of "Pressure sensors" (mbar):
  Insp. = 0.0 ± 1.0 mbar
  Exp. = 0.0 ± 1.0 mbar

- Display of calibration values Cal (V):
  Insp. = 1.74 ± 0.4 V
  Exp. = 1.74 ± 0.4 V

- Airway pressure measurement PAW display:
  Value (CPU PCB) in mbar = 0.0 ± 2.0 mbar

If the limits of "Insp." or "Exp." are not satisfied then one or both of the pressure sensor is/are outside of the tolerance. Check airway pressure sensors and/or replace, also check and/or replace respective valves (Y6.1 and Y6.2). If the limit of "(CPU PCB)" is out of tolerance then check CO_2 Carrier PCB.

Switch off Evita 4 / 2 dura.

4.4.4 Testing of airway pressure sensors

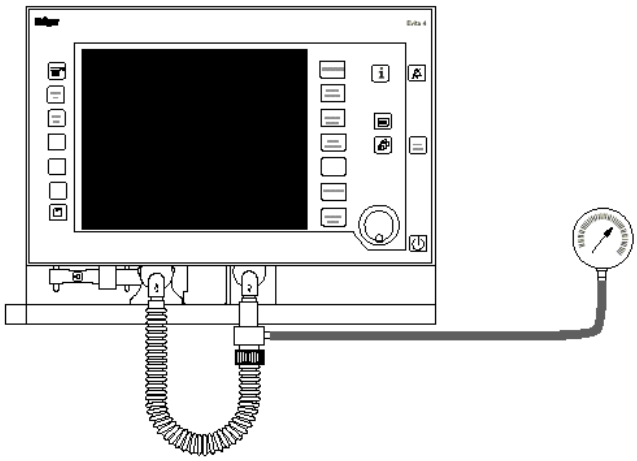
There are two possibilities for this test:
- First perform check according to 4.4.4.1 (less test equipment required)
- Perform test according to 4.4.4.2 only if 4.4.4.1 is not successful

Note for SW 4.n: Perform these test within 3 minutes after switching to standby! After this time the safety Y1.3 valve will be deactivated in standby and no pressure build up is possible. For activating the safety valve Y1.3 after this time again leave and enter standby.

4.4.4.1 Test 1

Note: During this test the outlet of the expiratory valve is sealed. The flow rate of 0.08 L/min. via the metering unit R1.1 builds up a pressure in the test set-up. At least 50 cmH_2O (mbar) should be attained here if there are no leaks in the test set-up and inspiration block. The values of the internal airway pressure measurement are compared to a reference gauge.

Test set-up:



Test equipment for test set-up:

- Pressure measurement device
- Silicon hose to connect pressure measurement device, max. length 500 mm (20 inch)
- T-Piece (conical sleeve)
  P/N 84 00 904
- Tubing system Evita adult, e. g. Hose Set E Blue P/N 84 12 092
- Rubber plug 24/30 P/N 79 01 666

- Remove flow sensor and seal off outlet of expiration valve with rubber plug.
- Create short circuit between inspiration and expiration socket with a short section of breathing hose.
- Connect pressure gauge (expected max. pressure 130 cmH_2O) to inspiration socket.
- Switch on unit:
- Switch unit to standby after finishing self test and confirm with "Alarm/Reset".
- Use the following keys to call up service mode:
  Evita 4: "Configuration" ⇒ "Basic setting" ⇒ "Service diagnosis" ⇒ "4 6 5 5"
  Evita 2 dura: "Configuration" ⇒ "Ventilation" ⇒ "4 6 5 5"
- Call up diagnosis page "Pneumatic" ⇒ "Sensors" in service mode.

Note for SW 4.n: Perform these test within 3 minutes after switching to standby! After this time the safety Y1.3 valve will be deactivated in standby and no pressure build up is possible. For activating the safety valve Y1.3 after this time again leave and enter standby.

Please note: 1 mbar = 1.02 cmH_2O

Test values:

- Display of pressure sensors "**insp**" and "**exp**" in (mbar):
  The test pressure attained governs the permissible deviations between the reading on the reference measuring instrument and the display of "insp" and "exp" in service mode:

50 - 70 mbar:	max. 2.0 cmH_20 (mbar) in each case
70 - 90 mbar:	max. 2.5 cmH_20 (mbar) in each case
90 - 110 mbar:	max. 3.0 cmH_20 (mbar) in each case

- Airway pressure measurement **PAW insp** and **(CPU PCB)** display:
  Max. deviation between **PAW insp**. and **(CPU PCB)** 3 cmH_20 (mbar)

If the limits of "Insp." or "Exp." are not satisfied then one or both of the pressure sensor is/are outside of the tolerance. Check airway pressure sensors and/or replace, also check and/or replace respective valves (Y6.1 and Y6.2). If the limit of "(CPU PCB)" is out of tolerance then check CO_2 Carrier PCB.

If OK remove all test set-ups and go to test 4.5. When removing rubber plug, make sure non-return valve in the expiratory valve is correctly positioned.

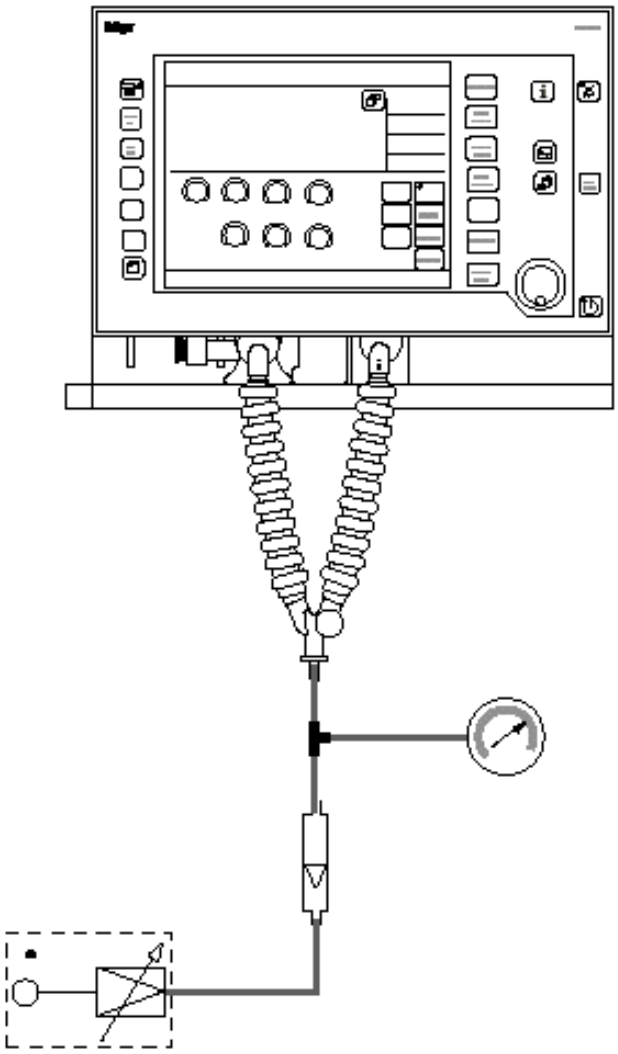
4.4.4.2 Test 2, only if test pressure build up in test 4.4.4.1 was not successful

Note: Perform the following checks if test pressure attained is not at least 50 cmH_20 (mbar) in the previous test 4.4.4.1:

- Check expiration valve for leaks; pay particular attention to tightness of cover.
- Check test set-up for leaks.
- Metering unit R1.1 outside tolerance of 0.08 ± 0.04 L/min.; can be re-measured at upper lip seal to expiration valve.
- Evita leaking (e.g. O2 amplifier); this becomes particularly apparent in the course of this test if leakage rates of more than 100 mL/min. have already been detected in the leak test forming part of the device check.

In addition make use of the following test set-up.

Test set-up:



Test equipment for test set-up:

- Tubing system Evita adult, e. g. Hose Set E Blue P/N 84 12 092
- Y piece P/N M 25 650 if no temperature sensor is available
- Test pressure regulator P/N 79 10 342
- Connection nozzle P/N M 06 258 for test pressure regulator
- Pressure measurement device
- Silicon hoses to connect pressure measurement device and flow meter
- Flow meter P/N 79 01 161
- Y piece P/N 2M 12 754
- Catheter connector set P/N 84 03 684 (some of the connectors are included in tubing system Evita P/N 84 12 092)
- Rubber plug 24/30 P/N 79 01 666

- Remove flow sensor and seal off outlet of expiration valve with rubber plug.
- Feed a small flow (max. rate 0.2 L/min) into the test set-up using test pressure regulator. Create a stable pressure between 60 and 112 cmH_2O (60 and 110 mbar).
- Switch off and on unit:
- Switch unit to standby after finishing self test and confirm with "Reset/Check".
- Use the following keys to call up service mode:
  Evita 4: "Configuration" ⇒ "Basic setting" ⇒ "Service diagnosis" ⇒ "4 6 5 5"
  Evita 2 dura: "Configuration" ⇒ "Ventilation" ⇒ "4 6 5 5"
- Call up diagnosis page "Pneumatic" ⇒ "Sensors" in service mode.

Note for SW 4.n: Perform these test within 3 minutes after switching to standby! After this time the safety Y1.3 valve will be deactivated in standby and no pressure build up is possible. For activating the safety valve Y1.3 after this time again leave and enter standby.

Please note: 1 mbar = 1.02 cmH_2O

Test values:

- Display of pressure sensors "**insp**" and "**exp**" in (mbar):
  The test pressure attained governs the permissible deviations between the reading on the reference measuring instrument and the display of "insp" and "exp" in service mode:

  50 - 70 mbar: max. 2.0 cmH_20 (mbar) in each case
  70 - 90 mbar: max. 2.5 cmH_20 (mbar) in each case
  90 - 110 mbar: max. 3.0 cmH_20 (mbar) in each case

- Airway pressure measurement **PAW insp** and **(CPU PCB)** display:
  Max. deviation between **PAW insp**. and **(CPU PCB)** 3 cmH_20 (mbar)

If the limits of "Insp." or "Exp." are not satisfied then one or both of the pressure sensor is/are outside of the tolerance. Check airway pressure sensors and/or replace, also check and/or replace respective valves (Y6.1 and Y6.2). If the limit of "(CPU PCB)" is out of tolerance then check CO_2 Carrier PCB.

If OK remove all test set-ups and go to test 4.5. When removing rubber plug, make sure non-return valve in the expiratory valve is correctly positioned.

4.5 Testing of O_2 sensor

Note: It is advisable to renew the O_2 sensor, if the voltage is less then 1.3V, as the minimum voltage level of 1.257 V will soon be reached.

Read out calibration voltage "Cal. [V]" of O_2 sensor in service mode on "Pneumatic" ⇒ "Sensors" page.

Test value:
The calibration voltage Cal. [V] displayed should be greater than 1.3 V

4.6 Testing of touch screen (Evita 4 only)

Note: After power on the Evita 4 performs a test of all light beams of the touch screen.

Test Setup:

Call up diagnosis page " Front" ⇒ " Microprocessor" in service mode.

The result of the light beams test is displayed under "Broken beams".
0 = OK
1 = Error, light barrier interrupted

Test value:

Optimally all light barriers on 0 = OK

(Columns from left to right) X = 0000000000 0000000000 0000000000 0000000000
(Rows from bottom to top) Y = 0000000000 0000000000 0000000000

If test values does not pass check:
- Object on touch window when switched on?
- Touch window surround dirty?

Important:
Faults are permitted if this does not impair function during operation, i.e. all screen keys are recognized during operation. Depending on size, one screen key is interrogated by several light barriers.

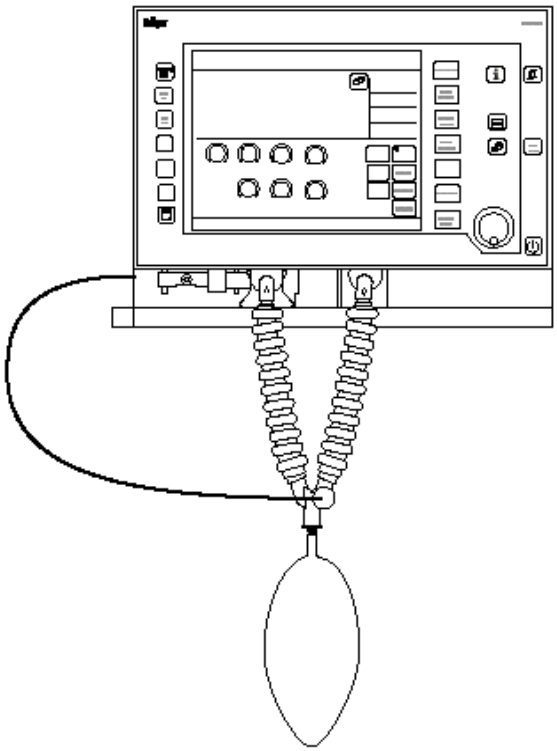
4.7 Documentation of display type

Readout type of display in service mode under "Front" ⇒ "Microprocessor" and enter type into the PMS Checklist form.

4.8 Tests in CMV ventilation mode

Important for Evita 4:
Use is made in further tests of the modes CMV and PCV+ in adult and pediatric mode. If either of these modes has not been configured by the user or is not envisaged, it can be established temporarily for test purposes as follows:
"Configuration" ⇒ "Ventilation" ⇒ "3 0 3 2".
The setting in use beforehand is to be entered again on completion of inspection and prior to hand over of the unit.

Test set-up:
Assemble Evita 4 / 2 dura ready for operation:



Test equipment for test set-up:

- Tubing system Evita adult, e. g. Hose Set E Blue P/N 84 12 092
- Y piece P/N M 25 650 if no temperature sensor is available
- Adult test lung, P/N 84 03 201 (with catheter connector ISO no. 7)

- Connect compressed O2 and Air supply (40 to 87 psi / 2.7 to 6 bar).
- Connect up adult tubing system with test lung **without** humidifier.
- Connect CO2 Sensor (option Evita 2 dura)
- Connect AWT temperature sensor (if available)
- Disconnect NeoFlow Sensor (option)

Settings:

Initial settings: Adults

Mode: CMV

Evita 4:	Evita 2 dura:
• In mode "Mode Settings" ⇒ "Extra settings": - Flow trigger off - Sigh off - Autoflow off • In mode "Mode Settings" ⇒ "Tube Compensation" (if available): ATC option off	• In mode: "Settings" ⇒ "Ventilation": - Sigh off - Autoflow (option) off • In mode: "Settings" ⇒ "ATC" (if available): ATC option off • Deactivate flowtrigger by way of trigger key and rotary knob (- - -).

Evita 4:			Evita 2 dura:		
Set Evita 4 ventilation pattern:			Set Evita 2 dura ventilation pattern:		
O_2	=	21	O_2	=	21
VT	=	0.500	VT	=	0.500
Tinsp	=	2	Tinsp	=	2
f	=	10	f	=	10
Flow	=	25	Flow	=	25
Pmax	=	max. (if applicable, can be configured)	Pinsp	=	max. (if applicable, can be configured)
PEEP	=	5	PEEP	=	5
Set Evita 4 alarm limits:			Set Evita 2 dura alarm limits:		
VTi	=	max	VTi	=	max
Paw	=	max	Paw	=	max
MV high	=	max	MV high	=	max
MV min	=	min	MV min	=	min

Start ventilation

4.8.1 Calibration of Evita 4/2 dura sensors during ventilation

Test set-up: See section 4.8.

Calibrate O_2 and expiratory flow measurement during ventilation.

4.8.2 Testing of pressure reducer DR1.1 for Air, DR1.2 for O_2, and dosing R1.2

Test set-up in addition to section 4.8:
- Connect pressure gauge to nebulizer outlet (expected max. pressure 2.5 bar / 36 psi).
- Connect compressed-Air supply only.
- switch on nebulizer

Test value for pressure reducer DR1.1 (Air):
Pressure gauge reading = 25.4 - 32.6 psi (1.75 - 2.25 bar)

Remove pressure gauge and connect flow meter to nebulizer outlet (expected max. flow 15 L/min).

Test value for dosing R1.2:
Flow in active inspiratory flow phase = 7.2 - 11 L/min

Change test set-up:
- Remove flowmeter
- Connect pressure gauge to nebulizer outlet (expected max. pressure 2.5 bar / 36 psi).
- Connect compressed-O_2 supply only.

Test value for pressure reducer DR1.2 (O_2):
Pressure gauge reading = 25.4 - 32.6 psi (1.75 - 2.25 bar)

Switch off nebulizer and remove test equipment.

If test values do not pass calibrate pressure regulators.

4.8.3 Testing of flow sensor switch

Test set-up: See section 4.8.

Slowly move expiratory flow sensor to left.

Test value:
Starting from the right stop visual and acoustic alarm is given after 1.5 to 4 mm. (1 inch = 25.4 mm).

Move expiratory flow sensor to the right again and acknowledge alarm.

If test value does not pass check flow sensor switch.

4.9 Testing of mixer, expiratory flow measurement and O_2 measurement

4.9.1 Testing of O_2 metering from mixer and O_2 measurement

Note: O_2 set value is compared to O_2 measured value. The measured value is displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura).

Test set-up: See section 4.8.

Change settings / test values:

O2 set value	O2 measured value
21	21 ± 2 Vol.%
30	30 ± 3 Vol.%
60	60 ± 4 Vol.%
90	90 ± 5 Vol.%
100	100 - 3 Vol.%

Set O_2 set value to 21.

If test values do not pass check the following parts:
- Supply pressure sensors, see test item 4.4.1 and 4.4.2
- HPSV Controller PCBs and HPSV Cartridges for Air and O_2, see also test item 4.9.2 and 4.9.3 and refer to Repair Instructions Pneumatics chapter HPSV.

4.9.2 Testing of volume metering from mixer and flow measurement in adult mode

Note: Testing accuracy of supply pressure sensors, mixer and flow measurement. The VT set value of 500 mL is compared with the measured value VT (VTe) with a set O2 concentration of 21 and 100 %Vol. under NTPD. The measured value is displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura).

Test set-up: See section 4.8.

If the value Pambient, read out in section 4.4.1 in the service mode, is:

- Equal or greater than 965 mbar, perform test 4.9.2.1

  or

- Less than 965 mbar, perform test 4.9.2.2

4.9.2.1 Testing at ambient pressure ≥ 965 mbar

Enter the following service numbers:

For Evita 4 under "Configuration" ⇒ "System Defaults" ⇒ "Service":
For Evita 2 dura under "Calib./Config." ⇒ "Ventilation":

3 9 9 9 + 3 9 4 8	=	Leakage Compensation off
3 9 9 9 + 3 9 5 8	=	BTPS off (= NTPD)
7 2 9 9 + 7 2 3 5 + 0 0 0 0	=	Set tube compliance correction to zero

This remains active until the unit is switched off.

Perform a flow calibration 30 seconds after changing the O_2 concentration in each case for a more accurate measurement.

Change settings / test values:

O2 set value	Vte measured value
21	450 - 550 mL
100	450 - 550 mL

Important: If at all possible, do not switch off unit prior test item 4.9.3.1
If test values do not pass check the following parts:

- Supply pressure sensors, see test item 4.4.1 and 4.4.2
- HPSV Controller PCBs and HPSV Cartridges for Air and O_2, see also test item 4.9.3 and refer to Repair Instructions Pneumatics chapter HPSV.
- Flow measurement if both values do not pass

4.9.2.2 Testing at ambient pressure < 965 mbar

Enter the following service numbers:

For Evita 4 under "Configuration" ⇒ "System Defaults" ⇒ "Service":
For Evita 2 dura under "Calib./Config." ⇒ "Ventilation":

3 9 9 9 + 3 9 4 8	=	Leakage Compensation off
7 2 9 9 + 7 2 3 5 + 0 0 0 0	=	Set tube compliance correction to zero

This remains active until the unit is switched off.

Enter service mode, call up diagnosis page " Pneumatic" ⇒ " Sensors" and read out the following factors under "Flowsensor":

- NTPS → BTPS
- BTPS → NTPD

The value displayed for VTe is to be corrected by the humidity error in the equation below:

$$\text{VTe corrected} = \frac{\text{VTe display value}}{(\text{Factor NTPS} \rightarrow \text{BTPS}) \times (\text{Factor BTPS} \rightarrow \text{NTPD})}$$

Perform a flow calibration 30 seconds after changing the O2 concentration in each case for a more accurate measurement.

Change settings / test values:

O2 set value	Vte measured value corrected
21	450 - 550 mL
100	450 - 550 mL

Important: If at all possible, do not switch off unit prior test item 4.9.3.2

If test values do not pass check the following parts:
- Supply pressure sensors, see test item 4.4.1 and 4.4.2
- HPSV Controller PCBs and HPSV Cartridges for Air and O_2, see also test item 4.9.3 and refer to Repair Instructions Pneumatics chapter HPSV.
- Flow measurement if both values do not pass

4.9.3 Testing of volume metering from mixer and flow measurement in pediatric mode

Note: Testing accuracy of supply pressure sensors, mixer and flow measurement. The VT set value of 50 mL is compared with the measured value VT (VTe) with a set O_2 concentration of 21 and 100 %vol under NTPD. The measured value is displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura).

Switch unit to standby.

Test set-up like in section 4.8 with the following differences:

- Connect neonatal test lung P/N 84 09 742 instead of adult test lung.
  Do **not** use a pediatric or neonatal tubing system because the compliance of the adult system is used in addition to the compliance of the neonatal test lung.

- On units featuring NeoFlow option:
  - Evita 4: Switch of "Neoflow" measurement under "Alarm limits" ⇒ "Monitoring".
  - Evita 2 dura: Switch off "Neoflow" measurement under "Calib./Config." ⇒ "Sensor" ⇒ "On/Off".
  - Disconnect neoflow sensor

Settings:

Initial settings: Pediatric

Mode: CMV

Evita 4:	Evita 2 dura:
• In mode "Mode Settings" ⇒ "Extra settings": - Flow trigger off - Sigh off - Autoflow off • In mode "Mode Settings" ⇒ "Tube Compensation" (if available): ATC option off	• In mode: "Settings" ⇒ "Ventilation": - Sigh off - Autoflow (option) off • In mode: "Settings" ⇒ "ATC" (if available): ATC option off • Deactivate flowtrigger by way of trigger key and rotary knob (- - -).
Set Evita 4 ventilation pattern: O_2 = 21 VT = 0.050 Tinsp = 1 f = 30 Flow = 6 Pmax = max. (if applicable, can be configured) PEEP = 0	Set Evita 2 dura ventilation pattern: O_2 = 21 VT = 0.050 Tinsp = 1 f = 30 Flow = 6 Pinsp = max. (if applicable, can be configured) PEEP = 0

Evita 4:			Evita 2 dura:		
Set Evita 4 alarm limits:			Set Evita 2 dura alarm limits:		
VTi	=	max	VTi	=	max
Paw	=	max	Paw	=	max
MV high	=	max	MV high	=	max
MV min	=	min	MV min	=	min

Start ventilation

If the value Pambient, read out is section 4.4.1 in the service mode, is:

- Equal or greater than 965 mbar, perform test 4.9.3.1

  or

- Less than 965 mbar, perform test 4.9.3.2

4.9.3.1 Testing at ambient pressure ≥ 965 mbar

Enter the following service numbers only if the unit has been switched of since test item 4.9.2.1:

For Evita 4 under "Configuration" ⇒ "System Defaults" ⇒ "Service":
For Evita 2 dura under "Calib./Config." ⇒ "Ventilation":

3 9 9 9 + 3 9 4 8	=	Leakage Compensation off
3 9 9 9 + 3 9 5 8	=	BTPS off (= NTPD)
7 2 9 9 + 7 2 3 5 + 0 0 0 0	=	Set tube compliance correction to zero

This remains active until the unit is switched off.

Perform a flow calibration 30 seconds after changing the O_2 concentration in each case for a more accurate measurement.

Change settings / test values:

O2 set value	Vte measured value
21	40 - 60 mL
100	40 - 60 mL

If test values do not pass check the following parts:
- Supply pressure sensors, see test item 4.4.1 and 4.4.2
- HPSV Controller PCBs and HPSV Cartridges for Air and O_2, see repair instructions pneumatics chapter HPSV.
- Flow measurement if both values do not pass

Switch unit to standby.

4.9.3.2 Testing at ambient pressure < 965 mbar

Enter the following service numbers only if the unit has been switched of since test item 4.9.2.2:

For Evita 4 under "Configuration" ⇒ "System Defaults" ⇒ "Service":
For Evita 2 dura under "Calib./Config." ⇒ "Ventilation":

3 9 9 9 + 3 9 4 8 = Leakage Compensation off
7 2 9 9 + 7 2 3 5 + 0 0 0 0 = Set tube compliance correction to zero

This remains active until the unit is switched off.

Enter service mode, call up diagnosis page " Pneumatic" ⇒ " Sensors" and read out the following factors under "Flowsensor":

- NTPS → BTPS
- BTPS → NTPD

The value displayed for VTe is to be corrected by the humidity error in the equation below:

$$\text{VTe corrected} = \frac{\text{VTe display value}}{(\text{Factor NTPS} \rightarrow \text{BTPS}) \times (\text{Factor BTPS} \rightarrow \text{NTPD})}$$

Perform a flow calibration 30 seconds after changing the O2 concentration in each case for a more accurate measurement.

Change settings / test values:

O2 set value	Vte measured value corrected
21	40 - 60 mL
100	40 - 60 mL

If test values do not pass check the following parts:
- Supply pressure sensors, see test item 4.4.1 and 4.4.2
- HPSV Controller PCBs and HPSV Cartridges for Air and O_2 (leakage), see repair instructions pneumatics chapter HPSV.
- Flow measurement if both values do not pass and if there is no leakage

Switch unit to standby.

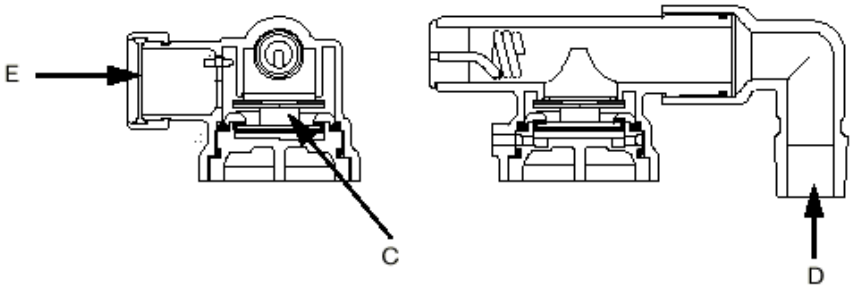
4.10 Testing of airway pressure measurement, pressure control, and bronchial suction

4.10.1 Testing and calibration of PEEP/PIP valve

Note: Testing if the PEEP/PIP valve is within the tolerance.

Test setup:

- The unit is switched to standby and compressed O2 and Air supply (40 to 87 psi / 2.7 to 6 bar) is connected.
- Disconnect ventilation hoses and flow sensor.
- Disconnect expiratory valve.
- Remove diaphragm system **C** from expiratory valve.
- Important: Close valve cover screw of expiratory valve firmly.



- Remove gasket (lip seal) with strainer (screen) **E** and seal this connector of the expiratory valve completely with a rubber plug P/N 7901666 or equivalent.
- Seal expiratory nozzle **D** completely with a rubber plug P/N 1294105 or equivalent.
- Mount the modified expiratory valve to the Evita 4 / 2 dura.

Use the following keys to start the PEEP/PIP valve calibration:
Evita 4: "Configuration" ⇒ "System Defaults" ⇒ "Service diagnosis" ⇒ " 4 7 9 9 + 4 7 4 7 ".
Evita 2 dura: "Calib./Config." ⇒ "Ventilation" ⇒ " 4 7 9 9 + 4 7 4 7 ".

The calibration may take more than 1 minute.

Test value:
- The calibration has been successfully completed if a flow sound of 0.2 seconds can be heard at the inspiration nozzle.
- The calibration failed if a flow sound of 1 second can be heard at the inspiration nozzle.

If the calibration passed:
- Remove both rubber plugs and check position of non-return valve (D5.1).
- Install diaphragm system and close valve cover screw.
- Install gasket (lip seal) with strainer (screen) **E**
- Install expiratory valve and flow sensor.

If the calibration does not pass check if:

- Diaphragm system of the expiratory valve has been removed.
- O-ring of valve cover screw is available and not damaged.
- Valve cover screw, nozzle **D**, and outlet **E** are completely sealed.

Repeat PEEP/PIP valve calibration. If the calibration fails again renew PEEP/PIP valve, refer to Repair Instructions Pneumatics section "Replacing the PEEP valve" and repeat PEEP/PIP valve calibration.

4.10.2 Testing of airway pressure measurement and pressure control

Note: The values of the airway pressure measurement are compared with the setting and to a reference gauge. The measured values are displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura).

Test set-up:

- See section 4.8

- Additionally connect a pressure gauge (expected max. pressure 100 cmH_2O / mbar) between Y-piece and test lung, for example by using a tapered socket P/N 84 00 904.

Settings:

Initial settings: Adults

Mode: PCV+

Evita 4:	Evita 2 dura:
In mode "Mode Settings" ⇒ "Tube Compensation" (if available): ATC option off	In mode: "Settings" ⇒ "ATC" (if available): ATC option off
Set Evita 4 ventilation pattern: O_2 = 21 Tinsp = 2 f = 10 Slope = 0.2 Pinsp = 25 PEEP = 5	Set Evita 2 dura ventilation pattern: O_2 = 21 Tinsp = 2 f = 10 Slope = 0.2 Pinsp = 25 PEEP = 5
Set Evita 4 alarm limits: VTi = max Paw = max MV high = max MV min = min	Set Evita 2 dura alarm limits: VTi = max Paw = max MV high = max MV min = min

Start ventilation

Test values:

- The measured values are displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura):

  PEEP = 5 +/- 1 cmH_2O

  Ppeak = 25 +/- 2 cmH_2O

- Test values for reference pressure gauge reading:

  Inspiration = 25 +/- 2 cmH_2O (mbar)

  Expiration = 5 +/- 1 cmH_2O (mbar)

Alter PEEP setting to 1:

Test value:

- The measured value for PEEP is displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura):

  PEEP = 1 +/- 1 cmH_2O (mbar)

Alter Pinsp setting to 50:

Test value:

- Test values for reference pressure gauge reading:

  Inspiration = 50 +/- 3 cmH_2O (mbar)

If test values do not pass check crater of expiratory valve, and calibrate or renew PEEP/PIP valve, refer to Repair Instructions Pneumatics section "Replacing the PEEP valve".

Alter Pinsp setting to 25 for the next test.

Repeat this test with all available expiratory valves

4.10.3 Testing bronchial suction program

Note: Testing recognition of patient reconnection during bronchial suction program.

Test setup and settings:
Leave all setups and settings from the previous test the same, but remove the pressure gauge between Y-piece and test lung. Connect test lung to Y-piece.

- Press the "O2 suction" key until the yellow LED in the key lights up continuously:
  Display in the help line at the bottom edge of the screen starts with "O2 enrichment 180s" with the remaining time displayed.

- Before the 180s "O2 enrichment" time ends disconnect test lung:
  Display shows "Execute suction and reconnect 120s" with the remaining time displayed"

- Before half of the 120s "Execute suction" time is over reconnect test lung:
  The Evita 4/2 dura continues ventilating with the set ventilation mode within 20s most.
  The display shows "Final O2 enrichment 120s" with the remaining time displayed.

- Cancel oxygenation program by pressing the "O2 suction" key.

If Evita 4 / 2 dura does not continue with the ventilation after reconnecting the test lung within 20 seconds calibrate or renew PEEP/PIP valve, refer to Repair Instructions Pneumatics section "Replacing the PEEP valve".

4.11 Testing of temperature measurement

4.11.1 Testing of temperature measurement with sensor simulator

Test set-up:

Connect temperature sensor dummy AWT P/N 79 00 405 and set it to "Test" at 34 °C.

Test value:

The measured temperature is displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura).

Temp. = 34 +/- 1 °C

If test values do not pass replace CO_2 Carrier PCB.

4.11.2 Testing of temperature sensor P/N 84 05 371 (if available)

Test set-up:

Connect up temperature sensor and take reference measurement at room temperature.

The measured temperature is displayed in the "Measured values" menu (Evita 4) or in the "Measurements" menu (Evita 2 dura).

Test value:

Permissible deviation between displayed value and reference measurement 2 °C.

If test values do not pass replace temperature sensor.

4.12 Testing of Keypad and Remote Pad

Change test set-up: See section 4.8.

4.12.1 Testing of Evita keypad

Press all assigned keys on keypad.

Test value:
Test unit reaction in each case (with the exception of printer key).

4.12.2 Testing of Remote Pad (option, as of SW 4.n)

Connect Remote Pad.

Press all assigned keys on Remote Pad.

Test value:
Test unit reaction in each case.
Note: For testing the key "Alarm reset" create an alarm e.g. by disconnecting the test lung during ventilation until an alarm (red with 3 exclamation marks) is displayed, reconnect test lung afterwards. Confirm blue alarm message with key "Alarm reset" on the Remote Pad, the blue alarm message shall disappear.

Testing LEDs:

Switch unit Off and On:

At the end of the Evita 4 / 2 dura self test all LEDs on the Remote Pad are activated for approx. 3 seconds.

4.13 Testing of mains failure and data saving for units without DC module

Test set-up and setting: See section 4.8.

Interrupt mains connection.

Test value:
Acoustic mains failure alarm is given.

Re-establish mains connection:

Test value:
Following a shortened version of the self-test (warm start), the unit recommences operation with the previously set ventilation mode.

4.14 Testing of DC module (option)

Important: The DC module can only be tested when the internal battery in the DC module has been charged.

Important: If the green charge indicator for the internal battery is not lit, continue to run unit on mains supply and proceed by performing test steps as of 4.15.

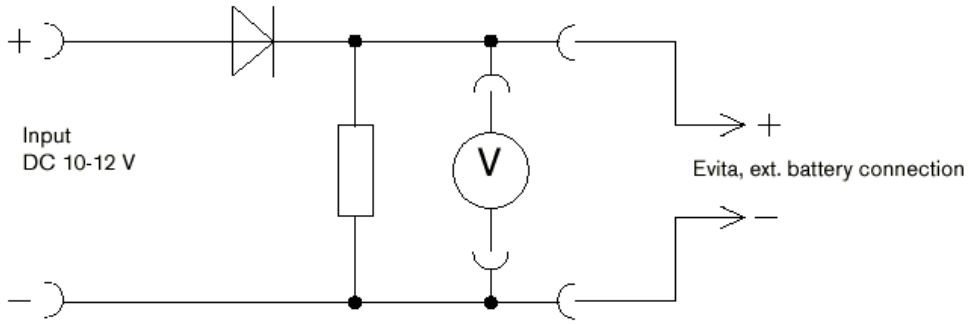
4.14.1 Testing of external battery

4.14.1.1 Testing of charging function of external battery

Test prerequisite:
- Evita 4 / 2 dura is switched on and runs on main voltage.
- Green charge indicator for internal battery lit.

Connect the following test set-up with charge tester to connection for external battery at power pack on back of unit and set voltage at voltmeter to 10 - 12 V.

Test set-up:



Test equipment for test set-up:
- Charge tester DC power pack P/N 79 10 385
- Measuring lead, red, 1m, set of 2, P/N 79 01 022
- Measuring lead, black, 1m, set of 2, P/N 79 01 023
- Multi meter 3 $^{1}/_{2}$ digits
- DC power supply 10 to 12 V

The test set-up simulates a flat battery. The DC power pack of the unit then attempts to charge the battery (Gel battery 13.8 V or 27.6 V with automatic recognition).

Note: Maximum test duration = 1 minute

Test Value:
Voltage at voltmeter is pulsed to > 20 V or continuously switched.

Remove test equipment.

If test values do not pass replace DC module for trouble-shooting.

4.14.1.2 Testing of function with external battery (if available)

Note: Test is only to be performed if the unit is provided with external battery.

Test set-up:
Connect external battery and interrupt mains connection.

Test value:
The unit remains operative without interruption and external battery supply is indicated on the display.

Re-establish mains connection.

If test values do not pass replace DC module for trouble-shooting.

4.14.2 Testing of internal batteries for all units with DC supply

Test set-up:
- Do not connect external battery.
- Interrupt mains connection and measure time of this point.

Test values:
- The unit remains operative without interruption and internal battery supply is indicated on the display.
- The capacity of the internal batteries must be sufficient to power the unit for at least 10 minutes.

Note: Perform the following tests 4.15 through 4.17 in the meantime until acoustical alarm sounds (in this case battery and mains failure). Then immediately check data saving as per test section 4.18 and electrical safety as per test section 5.

4.15 Testing of SpO_2 measurement (option)

Test Setup:
Connect Nellcor sensor simulator (Nellcor test simulator set P/N 79 01 069) by way of sensor extension cable (if provided) to socket for SpO_2 sensor on back of unit.

Note: LED in sensor dummy lights

Settings of sensor simulator:

- Pocket tester = No setting required

- SRC2 tester model:
  Rate = 38
  Light = HIGH 1
  Modulation = LOW
  RCAL/MODE = LOCAL/RCAL 63

Evita 4:
Activate SpO_2 measurement function by way of menu "Alarm limits" ⇒ "Monitoring" and read out measured values via menu "Values measured".

Evita 2 dura:
Activate SpO_2 measurement function by way of menu "Cal./Config." ⇒ "Sensor" ⇒ "On/Off" and read out measured values via menu "Measurements".

Test value:
Value displayed for oxygen saturation SpO_2 = 81 ± 2 %

Pull sensor dummy:
Visual and acoustic "SpO_2 sensor?" alarms.

Deactivate SpO_2 measurement function if it had been deactivated prior to testing.

If test value does not pass check and/or replace SpO_2 Module.

4.16 Testing of CO_2 measurement (option)

Test Setup:
CO_2 Sensor connected.

Evita 4:
Activate CO_2 measurement function by way of menu "Alarm limits" ⇒ "Monitoring".

Evita 2 dura:
Activate CO_2 measurement function by way of menu "Cal./Config." ⇒ "Sensor" ⇒ "On/Off".

4.16.1 Testing of lamp in CO_2 sensor

Test value:
Lamp in sensor lights.

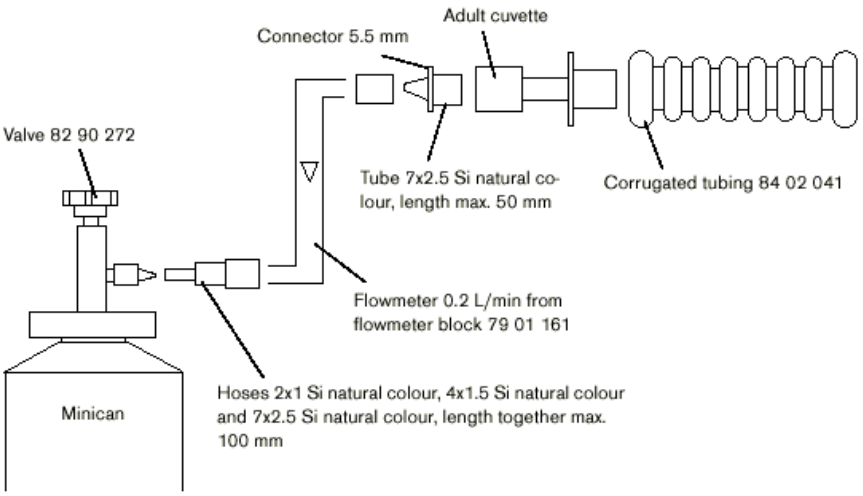
If test value does not pass use a different CO_2 sensor for trouble-shooting.

4.16.2 Testing and calibrating of CO_2 sensor measurement accuracy with test gas

Important: Calibration data is stored in CO_2 sensor, not in Evita!

Note: The zero calibration of the CO_2 sensor was performed in test item 4.2.2 during the device check.

Test set-up (shown w/o sensor):


Adult cuvette
Connector 5.5 mm
Valve 82 90 272
Tube 7x2.5 Si natural co-
lour, length max. 50 mm
Corrugated tubing 84 02 041
Flowmeter 0.2 L/min from
flowmeter block 79 01 161
Minican
Hoses 2x1 Si natural colour, 4x1.5 Si natural colour
and 7x2.5 Si natural colour, length together max.
100 mm

Test equipment for test set-up:

- Minican 5% CO_2 PN 68 50 435
- Minican valve P/N 82 90 272
- Flow meter P/N 79 01 161
- Corrugated hose P/N 84 02 041
- Silicon hoses to connect flow meter
- Catheter connector set P/N 84 03 684 (some of the connectors are included in tubing system Evita P/N 84 12 092)

Use can be made of different test and calibration gases: the ideal test gas in CO_2 in nitrogen:

- Test gas Minican 5% CO_2 (+/- 2% rel.), remainder nitrogen P/N 68 50 435

Also possible:

- Test gas with known CO_2 concentration between 4.5 and 5.5 Vol.% and known carrier gas comprising nitrogen, oxygen and/or nitrous oxide N_2O. The accuracy required for CO_2 is 2% relative.

The temperature of the Minican and test set-up must be between 20 and 30°C (68 - 86°F)

Enter test gas composition via menu:

- Evita 4: "Calibration" ⇒ "CO_2" ⇒ "Gas check" ⇒ N_2O and O_2
- Evita 2 dura: "Cal./Config." ⇒ "Sensor" ⇒ "CO_2 Calib." ⇒ CO_2, N_2O and O_2

Press "Start" or "Start Check".

Set a flow rate of 0.2 L/min ± 0.05 L/min in the test set-up using the scale for air.

Test values:

- For test gas CO_2 in nitrogen:
  Displayed FCO2 = CO_2 test gas concentration ± 4%

  Example: 5.0 Vol.% ⇒ Permitted value range: 4.8 to 5.2 Vol.%

- For test gas CO_2 in N_2O/O_2:
  Displayed FCO2 = CO_2 test gas concentration ± 5%

  Example: 5.0 Vol.% ⇒ Permitted value range: 4.75 to 5.25 Vol.%

If test value does not pass perform a CO_2 calibration:

- Evita 4: "Calibration" ⇒ "CO_2" ⇒ "Cal.", enter CO_2 concentration and "Start".
- Evita 2 dura: "Cal./Config." ⇒ "Sensor" ⇒ "CO_2 Calib." ⇒ "Start Calib.".

and repeat test.

Note: If calibration with calibration gas was unsuccessful, the factory-set calibration value can initially be used by pressing key "Cal. Reset" or "Reset".
Important: Recover the correct calibration as soon as possible!

If test values do not pass use a different CO_2 sensor for trouble-shooting.

4.16.3 Testing with span check filter

Insert Test Filter (span check) in sensor in place of cuvette and call up filter check:

- Evita 4: "Calibration" ⇒ "CO_2" ⇒ "Filter Check"
- Evita 2 dura: "Calib./Config." ⇒ "Sensor" ⇒ "CO_2 Check." ⇒ "Measure."

Test value:
The screen displays the test value of the CO_2 concentration FCO2. This value must agree to within ± 0.3 Vol.% with the specification on the test filter.

Example: 4.1 Vol.% on the filter: Permitted value range: 3.8 to 4.4 Vol.%

Push the CO2 sensor back on to the parking holder.

If test value does not pass:
The value stated on the filter applies to the given sensor and not to other sensors! The labeling can be changed following calibration with test gas.

Deactivate CO_2 measurement function if it has been deactivated prior to testing.

4.17 Cancelling error list

Evita 4: "Configuration" ⇒ "System Defaults" ⇒ "Service" ⇒ " 1 3 9 9 + 1 3 2 2 ".

Evita 2 dura: "Calib./Config." ⇒ "Ventilation" ⇒ " 1 3 9 9 + 1 3 2 2 ".

4.18 Testing of mains failure and data saving for units with DC module (option)

Test prerequisite for units with DC module:
Unit run without mains connection and without external battery until internal battery flat.

Test value:
Acoustic mains failure alarm is given.

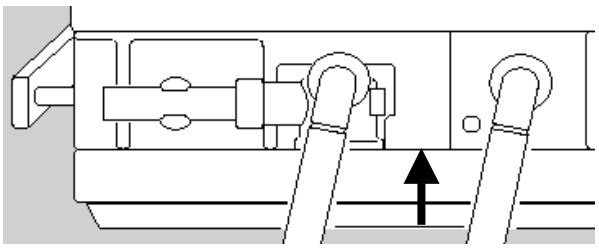
Re-establish mains connection:

Test value:
Following a shortened version of the self-test (warm start), the unit recommences operation with the previously set ventilation mode.

4.19 Testing of patient section heating with fan

Test values:

- After an operation time of 30 minutes, the temperature of the expiratory valve is appreciably higher than ambient the temperature.
- The flow of air from the fan right (see arrow) should hold a thin piece of paper 20 mm x 20 mm against the inlet strainer (1 inch = 25.4 mm)



Switch unit off.

If test values do not pass check patient heating.

4.20 Testing of interfaces

Test set-up:

- Unit is switched off.
- For the following tests, connect Evita 4/ 2 dura (COM 1) via RS232 extension cable (P/N 79 01 808) and RS232 adapter (P/N 79 10 888) to service PC.
- Start service program and go to "Meditest" ⇒ "Evita 4 / 2 dura".
- Switch on Evita.

4.20.1 Testing of COM 1

Test set-up: See test item 4.20.

Evita responds with "Dräger service Mode" after self-test

4.20.2 Testing of COM 2 and COM 3 (option, if available)

Test set-up: See test item 4.20.

Call up test item "RS232 Test" in PC service program via "Communication" menu.

Insert RS232 shorting plug (P/N 79 01 885) in COM 2 socket and start test:

Response on PC for COM 2: O K

Insert RS232 shorting plug (P/N 79 01 885) in COM 3 socket and start test:

Response on PC for COM 3: O K

If test values do not pass replace Communication PCB.

4.20.3 Testing of analog outputs (option, if available)

Test set-up: See test item 4.20.

Connect analog interface test cable (P/N 79 10 456) to the analog outlet.

4.20.3.1 Testing of analog output 1 (option, if available)

Connect voltmeter to corresponding sockets of the test cable for analog output 1.

Call up test item "Analog output 1" in PC service program via "Communication" menu.

Test values:

Enter set point in mV in each case, press key "Send" and check output voltages:

Set value	Test value
0000 mV	0 to 5 mV
2050 mV	2040 to 2060 mV
4095 mV	4075 to 4115 mV

If test values do not pass replace Communication PCB.

4.20.3.2 Testing of analog output 2 (option, if available)

Connect voltmeter to corresponding sockets of the test cable for analog output 1.

Call up test item "Analog output 2" in PC service program via "Communication" menu.

Test values:

Enter set point in mV in each case, press key "Send" and check output voltages:

Set value	Test value
0000 mV	0 to 5 mV
2050 mV	2040 to 2060 mV
4095 mV	4075 to 4115 mV

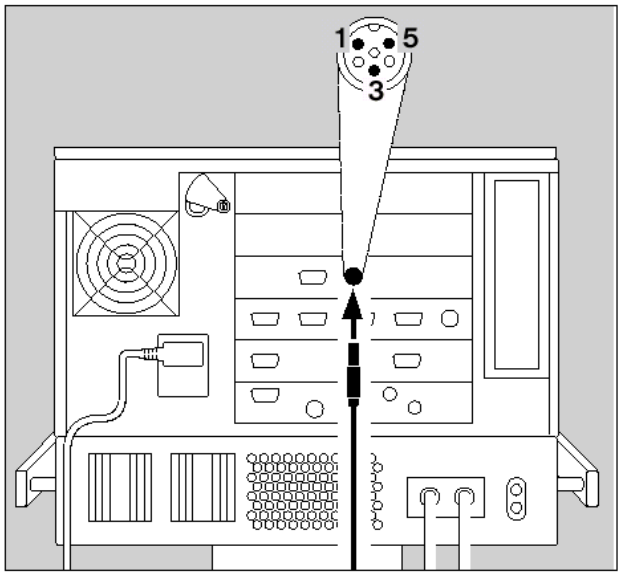
If test values do not pass replace Communication PCB.

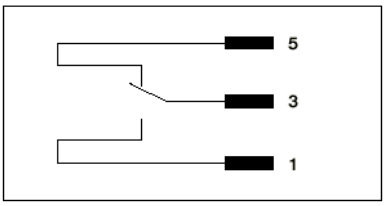
4.20.4 Testing nurse call (option as of SW 4.n, if available)

Test set-up: See test item 4.20.

Call up test item "Central alarm" in PC service program via "IFCO" menu.

Measure the resistance of the potential-free DC contacts between contacts 3 - 5.





Test values with check box "central alarm" deactivated:

Resistance 3 - 5 = contact open

Test values with check box "central alarm" activated:

Resistance 3 - 5 = contact closed

If test values do not pass replace Kit Nurse Call with the Multi Function PCB.

4.20.5 Testing of ILV interface

For Evita 2 dura with installed "Ventilation Plus" option and all units Evita 4.
Note: This test is not necessary for Evita 2 dura without installed "Ventilation Plus" option (the ventilation mode ILV is part of this option).

If the installed software version is:

- 3.21 or older, perform test 4.20.4.1 with the PC service program
- 4.00, perform test 4.20.4.2 in the Evita operating mode

4.20.5.1 ILV test 1

Test set-up: See test item 4.20.

Connect test plug, ILV interface (P/N 79 10 455) to ILV interface of Evita.

Call up test item "ILV" in service program via "Electronic" and press "Send".

Test value:

Response on PC: O K
O K

If test values do not pass replace CPU 68332 PCB.

Switch off Evita and remove all test equipment.

4.20.5.2 ILV test 2, for units with installed software version 4.00 only

Switch off Evita and remove all test equipment.

Test set-up: See test item 4.8. In addition connect test plug, ILV interface (P/N 79 10 455) to ILV interface of Evita.

Switch on Evita.

Important for Evita 4:
Use is made in this test of the mode ILV Master in adult patient mode. If this mode has not been configured by the user or is not envisaged, it can be established temporarily for test purposes as follows:
"Configuration" ⇒ "Ventilation" ⇒ "3 0 3 2".
The setting in use beforehand is to be entered again on completion of inspection and prior to hand over of the unit.

Settings:

Initial settings: Adults

Mode: ILV Master

Evita 4:	Evita 2 dura:
• In mode "Mode Settings" ⇒ "Extra settings": - Flow trigger off - Sigh off • In mode "Mode Settings" ⇒ "Tube Compensation" (if available): ATC option off	• In mode: "Settings" ⇒ "Ventilation": Sigh off • In mode: "Settings" ⇒ "ATC" (if available): ATC option off • Deactivate flowtrigger by way of trigger key and rotary knob (- - -).
Set Evita 4 ventilation pattern: O_2 = 21 VT = 0.500 Tinsp = 5 f = 6 Flow = 25 Pmax = max. (if applicable, can be configured) PEEP = 5	Set Evita 2 dura ventilation pattern: O_2 = 21 VT = 0.500 Tinsp = 5 f = 6 Flow = 25 Pinsp = max. (if applicable, can be configured) PEEP = 5
Set Evita 4 alarm limits: VTi = max Paw = max MV high = max MV min = min	Set Evita 2 dura alarm limits: VTi = max Paw = max MV high = max MV min = min

Start ventilation.

Use the following keys to call up service mode:
Evita 4: "Configuration" ⇒ "System Defaults" ⇒ "Service diagnosis" ⇒ "4 6 5 5"
Evita 2 dura: "Calib./Config." ⇒ "Ventilation" ⇒ "4 6 5 5"

Note: Evita 2 dura requires the option "ServicePlus" or connect RS232 cable P/N 79 01 808 or P/N 79 01 888 to COM1. Otherwise, no data will be displayed in service mode.

Call up diagnosis pages "Electronic" ⇒ "Microprocessor" in service mode.

Read out values for **ILV in/out** $\mathbf{X_{in}\ Y_{in}\ /\ X_{out}\ Y_{out}}$.

Test values:

The signals X_{in} Y_{in} / X_{out} Y_{out} are changing during ventilation, the signals X_{in} to X_{out} and Y_{in} to Y_{out} are inverted (e. g. X_{in} Y_{in} / X_{out} Y_{out}: 00/11, 01/10, 10/01, or 11/00). The alarm "ILV sync. inop !!!" can be ignored.

If test values do not pass replace CPU 68332 PCB.

Switch off Evita and remove all test equipment.

5 Electrical Safety Test

Electrical Safety Test according to CAN/CSA - 22.2 No. 601.1 - M90 with tester Biotek Model 501 Pro.

- **Warning**: These tests can expose personnel to hazardous electric shock and must be carried out with caution.
- Disconnect external batteries (if available on units with DC option)
- Note: Do not plug the Biotek 501 Pro safety analyzer power cord into a line isolation monitor as inaccurate readings may occur.
- Plug the Biotek 501 Pro power cord into a live AC receptacle, place the power switch of the Biotek 501 Pro to the "1" or ON position and ensure that the keys marked "GROUND", "NEUTRAL" and "POLARITY" are in the NORMAL position.
- Note: If the corresponding red LEDs for Ground, Neutral, and Polarity are not lit, they are in the normal position.

5.1 Chassis Resistance Testing

- Attach the ground lead from the red "Test lead" input to the ground hole of the AC test receptacle on the Biotek 501 Pro. Select the "Single lead" condition by ensuring that the "SINGLE/DUAL" key is not illuminated. Press the gray key marked "RESIST", then press the blue key marked "CAL". When the word CAL is no longer shown in the display window of the Biotek 501 Pro, you may proceed.
- Remove the red lead from the ground hole of the AC test receptacle and attach the alligator clip to the free end, leaving the other end plugged into the red "Test lead" input of the Biotek 501 Pro with the "Single Lead" and "Resistance" conditions still selected.
- Plug the Evita 4 / 2 dura power cord into the test receptacle of the Biotek 501 Pro. The resistance reading then shown on the Biotek 501 Pro is the "Chassis Resistance". Bend

and exercise the power cord to check for intermittent reading when probe is attached to the potential ground stud (test item 5).

- Perform 4 tests with the probe attached to the following test items of the Evita 4 / 2 dura:

  1) Pneumatics gas connection, back side of Evita 4 / 2 dura

  2) Screws of PCBs electronic system, back side of Evita 4 / 2 dura

  3) Screws on front panel

  4) Rails, on side of Evita 4 / 2 dura

  5) Attach probe with an alligator clip to the potential ground stud of the power pack on the back side of Evita 4 / 2 dura.

- Maximum allowable test value:

Chassis Resistance	0.2 Ohm

- Afterwards leave alligator clip at the potential ground stud.

5.2 Enclosure Leakage Current (Chassis Leakage Testing)

- Press the gray "LEAKAGE" key, leaving all other selections from the previous test the same.
- Switch on Evita 4 / 2 dura and allow the unit to complete the self test.
- Set up the Biotek 501 Pro for the following tests by using the white keys labeled "Ground", "Neutral" and "Polarity".
- Note: If the corresponding red LEDs for Ground, Neutral, and Polarity are not lit, they are in the normal position.
- This is a measurement of the leakage current from the Chassis to earth ground.
- Maximum allowable test values under Normal Condition:

Normal Ground, Normal Polarity, Normal Neutral:	100 µA
Normal Ground, Reverse Polarity, Normal Neutral:	100 µA

- Maximum allowable test values under Single Fault Condition:

Open Ground, Normal Polarity, Normal Neutral:	500 µA, but not 0 µA
Open Ground, Reverse Polarity, Normal Neutral:	500 µA, but not 0 µA

5.3 Earth Leakage Current (Ground Wire Leakage Testing)

- Remove the red lead with the alligator clip from potential ground stud of the power pack of the Evita 4 / 2 dura.
- Remove the alligator clip from the red test lead and plug this end into the green input jack "GROUND" on the back panel on the Biotek 501 Pro.
- Leave all other selections from the previous test the same.
- The Evita 4 / 2 dura is still switched on.
- Set up the Biotek 501 Pro for the following tests by using the white keys labeled "Ground", "Neutral" and "Polarity".
- Note: If the corresponding red LEDs for Ground, Neutral, and Polarity are not lit, they are in the normal position.
- This is a measurement of the leakage current flowing through the ground wire of the power cord.
- Maximum allowable test values under Normal Condition:

Open Ground, Normal Polarity, Normal Neutral:	500 µA, but not 0 µA
Open Ground, Reverse Polarity, Normal Neutral:	500 µA, but not 0 µA

- **Important for units with DC option for the next measurement:**
  Run unit without mains connection or with "Open Neutral" until internal batteries are flat and acoustic mains failure alarm sounds. The screen must be blank for the next measurement on units with DC option!
- Maximum allowable test values under Single Fault Condition:

Open Ground, Normal Polarity, Open Neutral:	1000 µA
Open Ground, Reverse Polarity, Open Neutral:	1000 µA

- Do **not** switch off Evita 4 / 2 dura for test item 5.4.

5.4 Patient leakage current entire electronics to earth

- Remove the test lead from the Biotek 501 Pro and leave all other selections from the previous test the same.
- Use one of the 2 possibilities for the test set-up:

1. For all units possible:

   - Short the two pins of the temperature connection by using "Shorting plug, AWT sensor" P/N 79 10 364.
     Also possible is to short the ILV connection (but not pin 2, 5 and 7 !!!) by using the previous version of the test cable "Measuring line, 9-pin Evita 4 / 2 dura" with the P/N 79 10 393 (no longer available).

   - Plug the other end into the input jack "RA" of the Biotek 501 Pro.

2. For units with installed NeoFlow option only:

   - Connect a flow sensor cable on the back side of the Evita 4 / 2 dura.

   - Short all pins of the flow sensor cable using the shorting plug 79 01 772.

   - Plug the other end into the input jack "RA" of the Biotek 501 Pro.

- Select the "ECG LEAK" key on the Biotek 501 Pro.

- Use the Increment or Decrement arrow on the Biotek 501 Pro to select the "RA-Gnd" option.

- Set up the Biotek 501 Pro for the following tests by using the white keys labeled "Ground", "Neutral" and "Polarity".

- Maximum allowable test values under Normal Condition:

Normal Ground, Normal Polarity, Normal Neutral:	100 µA
Normal Ground, Reverse Polarity, Normal Neutral:	100 µA

- Maximum allowable test values under Single Fault Condition:

Open Ground, Normal Polarity, Normal Neutral:	500 µA
Open Ground, Reverse Polarity, Normal Neutral:	500 µA

- Only if **no** SpO2 option is available: Switch off Evita 4 / 2 dura and remove the test equipment.

5.5 Patient leakage current SpO2 connection to earth (only if option is fitted)

- Remove the test lead from the Biotek 501 Pro and leave all other selections from the previous test the same.

- Connect shorted SpO2 connector to the input jack "RA" of the Biotek 501 Pro by using the test cable from the "Nellcor test simulator set" P/N 79 01 069.

- Maximum allowable test values under Normal Condition:

Normal Ground, Normal Polarity, Normal Neutral:	100 µA
Normal Ground, Reverse Polarity, Normal Neutral:	100 µA

- Maximum allowable test values under Single Fault Condition:

Open Ground, Normal Polarity, Normal Neutral:	500 µA
Open Ground, Reverse Polarity, Normal Neutral:	500 µA

- Switch off Evita 4 / 2 dura and remove the test equipment.

6 Supply unit to Customer ready for operation

If the configuration was altered, it is to be reset to the previous Customer configuration.

Important information for units with DC module (option):
Hand over Evita in standby setting for mains operation so that internal batteries are charged.

7 PM Certification Procedure

- Completely fill in the header information of the document PMS Checklist Evita 4 / 2 dura.
- If the Evita 4 / 2 dura passed all tests above in this document, fill out the "PM CERTIFICATION" label (P/N S010006 with "Call 1-800-543-5047 for service" / P/N S010007 w/o service number). Check box "Certified" and write the month and year, (six month from date of PM Certification) next to "NEXT VISIT DUE".
  Any Evita 4 / 2 dura not receiving a "PM CERTIFICATION" label shall receive a "WARNING NOT CERTIFIED" label (P/N 4114857). This label shall be placed at a prominent location after the previous "PM CERTIFICATION" label has been removed.
- Have the Customer sign each PMS Checklist form and review the equipment conditions with the Customer.
- Return the top copy to Dräger Medical, Inc. Service Department, keep the middle copy for service organization records, and give bottom copy to customer.
- Place unit at the user's disposal ready for operation.

End of procedure for Preventive Maintenance Service Evita 4 / 2 dura.